

INTERPRETATIVE RECONSTRUCTION OF A MODERNIST VILLA BASED ON RESEARCH INTO ITS HISTORICAL CONTEXT

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Abstract

The article describes the process of aesthetic modernization together with the renovation of a modernist villa from 1932 located on the border of Poznan's 'Abyssinia' district, which was built in the 1930s. The building has not been fully completed, and its planned original external appearance remains unknown to this day. Thus, the research process is a combination of reconstruction and research hypotheses as to the intended form of the building. In the absence of source material, the decision was made to develop an original research method. This method, hereafter referred to as the "feature catalogue," was implemented in the villa reconstruction project. The catalogue and developed research method showed a 67% agreement between the design proposal (A) and 19% for (B). In view of the results obtained, concept (B) was rejected, while concept (A) was refined to a level of 86%. The conclusion of the article indicates the superiority of statistical research methods over traditional methods in historic architecture research.

Keywords: *Modernism; Reconstruction; Modernization; Research Method; Parameterization, Feature Catalogue*

Introduction

Contemporary architecture, but also the modernization of existing building substance, plays a key role in the historic urban environment, acting as a link between the past, present, and future. When modernizing and redeveloping existing structures, architects often seek to maintain harmony with the surrounding historical context [1]. Through thoughtful use of shapes, materials, and styles, they create works that not only meet contemporary needs but also fit into the rich urban fabric of the past eras [2]. In the case of Poznan, the objects located in the area of modernist housing estates [3], built in the first half of the 1930s in, among others, the district of Grunwald, are the subject of design activities related to modernization. The villa buildings in these areas have, over the course of several years, become the subject of design activities aimed, on the one hand, at restoring the original condition of the buildings and preserving their residential function. On the other hand, it was aimed at proposing a new form of use for these buildings, e.g., office or public use.

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Such activities allow for the prolongation of the functioning of objects meeting the criteria of heritage protection [4], but also they are a challenge for design teams, for whom it can be difficult to operate in a historical spatial environment [5] due to cooperation with the authorities responsible for heritage protection. In many cases design activities become a contribution to the search for an appropriate way to carry out the modernization of a building while looking critically at the issue of stylistic unity and perceiving a building with history as a design challenge [6].

Experimental part

Location of the survey site

The subject of this study is a residential building located in Poznan at Grochowska Street. The villa, which bears the hallmarks and features of modernism, was built around 1932 in an area that, in the interwar period, developed dynamically in terms of single-family housing. It was the Grunwald district, located on the western side of the city of Poznan. The development of single-family housing in this area was dictated by the lack of this type of high-standard housing in the city. In the first half of the 1930s, villa housing, in the case of Poznan, became a desirable asset, indicating social status [7].



Fig. 1. Post-war aerial view of 'Abyssinia' (on the right side). Source: <https://cyryl.poznan.pl>.

The city's development in this direction was driven by the shortage of housing-designated areas in interwar Poznan [8], including those of a villa character. The transformation of the city that took place during the building reform of 1902-1918 [9], carried out under the auspices of the Prussian authorities [10], did not provide for such a form of investment for the area where the villa was built. The accompanying photograph (Fig. 1) shows the nature of the settlement's foundation in Grunwald. These were large plots of land on which detached villas, accompanied by gardens, were systematically erected from the early 1930s onwards. The form of the buildings was mostly limited to cubic volumes, covered with a hipped or flat roof. The rhythm of the buildings was varied by rounded corners and characteristic clinker cladding. The building is

located in a compact development of a fragment of a housing estate in the district of Grunwald, surrounded by buildings with a single-family residential function; some of the neighboring buildings also have additional functions in the form of offices or commercial premises on the ground floors or basements of the buildings (Fig. 2.)



Fig. 2. The villa, current view from Grochowska Street, current state.

The role of the architect in the process of modernizing a historic building

Specialized knowledge and skill sets are needed by the architect in adaptive design activities, as well as the reuse and transformation of building structures that are part of our cultural heritage. The imagination and ingenuity of the designer are the first and most important requirements for someone who undertakes activities in a building with historical provenance. Any effective architectural intervention with reference to a historic building must start with these elements. Effective and responsible use of a building's existing attributes is the basis for successful projects. The architect should possess highly developed professional skills and a comprehensive understanding of architectural history, including how conceptual design ideas have evolved over time. Building technology is also a crucial consideration (Fig. 3).

By cataloguing and segregating all this information, while combining it with imagination, the architect contributes both to the development of values for historic properties and to historical continuity in the broad sense of the word. Rather than creating a conflict between the current needs and pre-existing features, whether historical, architectural, or technological, an inspiring synergy can be found between the old and the new by striving for compatibility and balanced contrast. The architect should work in a multidisciplinary team, collaborate with consultants, and not necessarily be the best specialist.

The role of specialists is to offer guidance on, for example, historical research, building physics, sustainable design, or building technology and technique. In addition, this sometimes requires collaboration with other architects who have competence and experience from other areas of technical expertise. Instead of being the traditional conductor of an orchestra, the architect acts as the leader of a multidisciplinary project team (similar to a musical ensemble), in which each member plays an instrument and is therefore as important as the other members of the group. Nevertheless, someone in this ensemble has to set the tone, and it is primarily the architect. As a conclusion to this part of the discussion, we would like to recall the words of a book by Marieke Kuipers and Wessel de Jonge [11], who define the need to reuse historical material in contemporary cities in the following way: 'It must not be an architecture that arises as a result of uncontrolled social and technical development, but an architecture that is based on analysis and theory, thus achieving an independent position anew' [11].

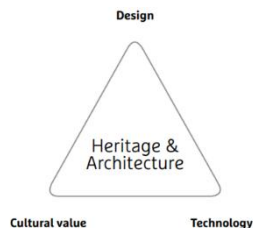


Fig. 3. Three basic elements of linking architecture with the concept of heritage conservation. The first - design, the second - cultural values, and the third - technology. Source: M. Kuipers, W. de Jonge, *Designing from Heritage—Strategies for Conservation and Conversion*, TU Delft—Heritage & Architecture, Delft 2017, p. 11.

Methods

As part of the pre-design activity, as is the case with many buildings with features and qualities related to the concept of heritage conservation, it was decided to relocate its key features with reference to the criteria presented in the work of Kuipers and de Jonge [11].

The compilation of research material, as summarized in the table above, provided the foundation for a detailed characterization of the building identified for modernization. Particular emphasis was placed on its architectural qualities, especially those aligning with the typical features of 1930s modernist design—such as simplified geometric forms, functional layouts, and minimal ornamentation. In the context of the proposed new functional program and taking into account both the building’s current technical condition [12] and the diagnostic questions outlined in figure 4, a comprehensive structural assessment was undertaken.

Questions on the heritage protection concept for a single-family residential building from 1932 in Poznan, based on M. Kuipers, W. de Jonge, <i>Designing from Heritage – Strategies for Conservation and Conversion</i>, TU Delft - Heritage & Architecture, Delft 2017, p. 33	
Questions	Objective/supporting measure
Which building/structure/heritage site are we looking at? <ul style="list-style-type: none"> ▪ Single-family residential building ▪ 2 floors overground. ▪ 1 floor underground 	Collection of administrative and quantitative data. <ul style="list-style-type: none"> ▪ Application for a zoning decision to the Authority ▪ Building permit
What is its value, and has it changed over time? <ul style="list-style-type: none"> ▪ The single-family residential building is part of a larger establishment—a housing estate from the 1930s in Poznan. ▪ The form of the building has not changed since its construction. ▪ The function of the building has not changed since its construction. ▪ A cubic shape characteristic of residential buildings from the 1930s. ▪ Characteristic staircase on a polygonal plan 	Collection of visual and usage data and measurements. <ul style="list-style-type: none"> ▪ Exterior building photography ▪ Interior building photography ▪ Archive search in the Municipal Building Archive ▪ Photographic research in the local press
What is it made of and what are the construction techniques? <ul style="list-style-type: none"> ▪ Solid brick ▪ Wooden intermediate flooring ▪ ‘Klein’-type structures above the basement 	Collection of building and material data. <ul style="list-style-type: none"> ▪ Building expertise on structural issues of the building ▪ Ground investigations

Fig. 4. Questions on the heritage protection concept for the 1932 villa building located in Poznan on Grochowska Street. Source: compilation by the authors

This evaluation focused on key load-bearing and envelope components, the results of which are presented in figures 5 and 6. The structural expertise aimed not only to identify critical

At the core of the research lies an existing villa, originally built in 1932. Significantly, the building was never fully completed, and its intended final architectural form remains unknown due to the absence of original design documentation, which has not been recovered despite archival inquiries. This uncertainty formed the basis for a key research assumption: the reconstruction of two alternative conceptual designs that hypothesize what the building's original completion might have looked like.

The first conceptual design interprets the villa through the lens of 1930s modernist architecture, adhering to the core principles of the movement—such as functional spatial organization, minimal ornamentation, and clarity of form. The second conceptual proposal explores an alternative historical hypothesis, suggesting that the villa might have originally been intended to follow the eclectic stylistic conventions typical of early 20th-century Poznań villas, particularly those resembling urban tenement houses with decorative facades and classical references. These two design scenarios serve as comparative tools for exploring possible conservation, adaptation, and reinterpretation strategies in the context of the building's incomplete architectural identity (Fig. 7).

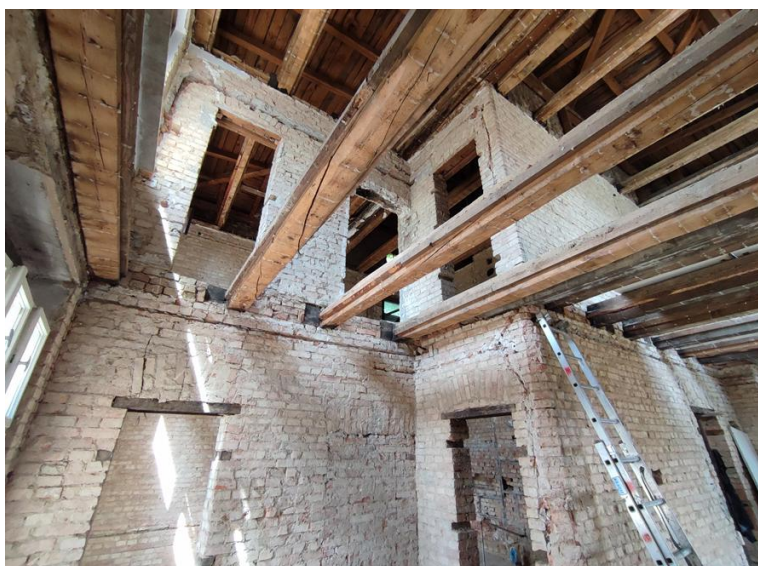


Fig. 7. View of the existing condition of the floor beams and load-bearing walls.

Description of the applied research tools

The research employed fundamental statistical methods alongside systematic photographic documentation to support the analytical process. Statistical tools were used to quantify key architectural and technical parameters, enabling objective comparison between different design solutions and construction stages. Photographic documentation, conducted at various phases of the project, served both as a visual record of the building's condition and transformation and as a basis for further interpretation of material changes, spatial relationships, and stylistic elements. Together, these methods provided a complementary qualitative and quantitative framework for evaluating the building's development within the broader context of architectural conservation and adaptation.

Description of the research procedure

The study was divided into four stages (Fig. 8), where the first one consisted of collecting photographic documentation and inventorying characteristic features of buildings located in the ‘Abyssinia’ district of Poznan. The buildings had to be subjected to a selection process - those that had not been modernized in accordance with the principles of historic preservation were an example of negative interference with the historic fabric and were excluded from the study.

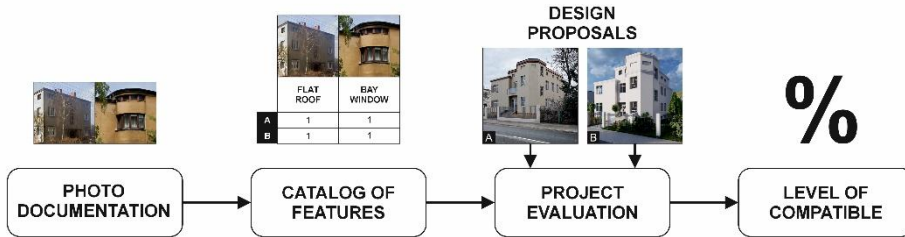


Fig. 8. A schematic diagram illustrating the research procedure was developed to visualize the sequence, interrelations, and methodological framework of the study. This diagram outlines each stage of the research process—from the initial identification and documentation of the case study through the formulation of research assumptions to the comparative analysis of conceptual design variants and final conclusions. It serves as a concise representation of the workflow, clarifying the logic and structure behind the adopted approach.

The selection was based on guidelines taken from historical sources, where the most relevant ones were described in the Polish Building Law [13] of 1928. Based on the building documents, it was possible to define the boundary conditions that the residential architecture of the interwar period should meet. The described assumptions specify the geometrical features, choice of materials, colors, and dimensions of the distinct parts of the buildings erected in this location in the 1930s (Fig. 9).



Fig. 9. The study includes a selection of negative examples of modernization interventions carried out on modernist buildings located in the ‘Abyssinia’ district. These cases were analyzed to highlight the consequences of inappropriate renovation practices, including the loss of original architectural features, the use of incongruous materials, and the introduction of stylistically inconsistent elements. By documenting these unsuccessful transformations, the research aims to identify common errors and oversights that compromise the historical and aesthetic value of early 20th-century modernist architecture. These examples serve as a critical reference point in shaping responsible design strategies for future conservation and adaptation projects.

The second stage of the research involved creating a catalogue of the formal characteristics of building massing representative of the district’s modernist style. The author's research method was used, which is an extension of the research method described by Marieke Kuipers and Wessel de Jonge [10]. Twenty-one form features were identified. All adopted features were divided into three groups: geometry, articulation, and materials—creating a structured set of formal solutions.

The ‘GEOMETRY’ group included features such as a covered entrance, row windows, and a window bay. The most numerous group, ‘ARTICULATION,’ included, among others, a glazed corner, window beltline, inter-window beltline, and horizontal band balustrades, while the group ‘MATERIALS’ included considerations related to the materials used for the cornice, fence, and plinth, as well as the color of the plaster. Following the research concept presented in the publication ‘Methods of supporting the design of residential architecture—from system methods to grammar of forms’ [14], the set of features, together with illustrations, was collected in a table (Fig. 10).



Fig. 10. Evaluation of two different project proposals in the adopted evaluation system.

The third stage of the study consists of evaluating two distinctive design concepts according to an established scheme. If a given design concept meets a certain feature criterion, a value of 1 is recorded in the table. Otherwise, the given design proposal receives a value of 0. The obtained results are collected in a table and passed on for further calculations. In the fourth step, using standard statistical methods (average), the percentage of compliance with the feature catalog is determined for each design proposal separately.

Results

The modernist concept (A) scored 14 features in agreement out of a possible 21, giving a rounded score of 67% agreement with the feature catalog. The early twentieth-century style concept (B) scored 4 conforming features out of a possible 21, giving a rounded score of 19% conformance with the feature catalogue (‘STRONGLY INCOMPATIBLE’ level). In view of the results obtained, concept A was considered to be correct. A concordance level of 67% for concept A was considered satisfactory (‘CONFORMING’ level) in the adopted evaluation system (Fig. 11), but there was room for improvement.

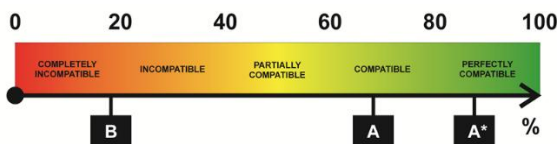


Fig. 11. Adopted evaluation system with highlighted results for individual project proposals.

Design decisions in the face of research findings

The study found an extreme incompatibility between concept (B) (Fig. 12) and the catalog of features. The proposal was considered to have no chance of improvement and was consequently rejected altogether. Corrective action was taken against concept (A) (Fig. 13), although it showed an acceptable level of compatibility.



Fig. 12. South-west elevation, after changes regarding the sub-criteria of the method, selection of variables.



Fig. 13. The south-west façade of the building, documented in its original state prior to any modifications, was analyzed in relation to the sub-criteria defined within the adopted research method. This analysis focused on the selection and evaluation of specific architectural and technical variables relevant to the façade's historical, aesthetic, and structural characteristics. Particular attention was given to aspects such as material integrity, composition and proportion, window typology, and decorative elements, all of which were assessed for their compliance with the stylistic framework of 1930s modernism. This evaluation provided a foundational reference for determining the scope and direction of proposed interventions.

The study revealed some features of the design proposal's incompatibility with the accepted catalog of features. Concept (A) failed to meet, amongst other features, the presence of a horizontal strip balustrade, an inter-window post with glazed ceramic tile cladding, a brick fence, a fixed wicket, and tiles.

In the opinion of the authors, the use of a base of variables in the search for the form of the building, which, on the one hand, fulfils the assumptions and the coexistence of the new building with the existing historical spatial context was successful. On the one hand, a clear and clean body of the building was created, while the atmosphere and character of the district in which the building is located was preserved.

Future lines of research

The aesthetic dimension of modernist architecture is characterized by a set of features that lend themselves particularly well to objective analysis due to their quantifiable nature. Elements such as geometric regularity, façade articulation, and material consistency—hallmarks of the modernist style—can be systematically parameterized. This allows for their structured evaluation using numerical data rather than relying solely on descriptive or interpretative methods. Adopting

a statistical approach to assess the degree of alignment between a proposed design and an established set of modernist aesthetic criteria offers a significant methodological advantage. Unlike traditional assessments that often depend on the subjective judgment of the designer or critic, a quantitative framework enables more reproducible, transparent, and comparative analyses. From a research perspective, this methodological shift not only strengthens the objectivity of design evaluation but also opens new avenues for the study of architectural authenticity, stylistic fidelity, and the measurable impact of interventions on historically significant buildings.

Discussions

The results demonstrate that the feature catalogue can serve as a transparent analytical tool for evaluating alternative reconstruction scenarios when archival documentation is incomplete or unavailable. In this case, the method made it possible to compare two hypotheses using the same set of formal criteria, rather than relying solely on intuitive stylistic judgement.

The contrast between concept (A), which reached a 67% level of compliance, and concept (B), which reached only 19%, confirms that the modernist interpretation is considerably more consistent with the architectural character of the ‘Abyssinia’ district. At the same time, the subsequent refinement of concept (A) to 86% shows that the catalogue should not be treated as a mechanical design formula, but as a decision-support framework that helps the designer identify which features require further adjustment.

The adopted procedure therefore links historical interpretation, architectural design, and quantitative assessment. Its main limitation is the need to define the catalogue of features carefully for each specific context; however, this limitation is also a strength, because it requires the method to remain grounded in local architectural evidence.

Conclusions

Historical research has demonstrated that the modernist villa located on the edge of the ‘Abyssinia’ neighborhood is an important element of the interwar modernist architectural heritage of Poznań. Its position within the urban structure of the district reinforces its historical significance. The inventory and analysis of the existing condition revealed structural problems and indicated the need for modernization works aimed at preserving the villa’s historic values. The study also defined the scope of interventions necessary to protect the original architecture and details of the building. The cultural value of the villa was confirmed and strengthened through the design and research process, making heritage protection one of the key aspects of the project.

The building survey included structural analysis and proposals for upgrades that would bring the villa up to contemporary building and technical standards. At the same time, the proposed interventions were formulated to minimize their impact on the original character of the building.

The adaptation and extension design integrates contemporary principles of sustainability, accessibility for people with disabilities, and energy efficiency [15]. It also incorporates modern technologies, including intelligent building management systems, to improve the quality of use. The research presented in this article was carried out in close collaboration with local authorities, conservation services, and experts from various disciplines, ensuring that the social [16], cultural, and technical aspects of the project were taken into account.

The architectural project for the adaptation and extension of the modernist villa situated prominently within the ‘Abyssinia’ district of Poznań represents a model example of a

comprehensive and balanced approach to heritage conservation. The project reconciles the protection of historical architectural values with the requirements of contemporary functionality, user comfort, and current building standards (Fig. 14). The complexity of the undertaking required interdisciplinary cooperation between specialists in architecture, structural engineering, conservation, building physics, and installation systems.



Fig. 14. Perspective view of the villa from Grunwaldzka Street in the final version to be implemented.

Particular attention was paid to integrating new architectural elements in a manner that respects the original modernist character of the building while ensuring that all technical interventions meet current regulations and user expectations. If successfully implemented, the project will not only revitalize a neglected architectural asset, but also contribute to the broader discourse on the preservation and adaptive reuse of modernist heritage in Poznań. As such, it may become a reference point for future interventions in similar urban and historical contexts.

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